

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

1. (Currently Amended) In a multi-stage turbine fuel pump for automotive vehicles, the pump having an inlet section through which low pressure fuel is drawn into the pump, the inlet section includes an end cap having an open sided recess formed therein, the pump further having a first pump stage, which includes an impeller and a port plate in which the impeller is installed, the port plate having an interiorly formed open sided, spaced cylindrical channel which has an internal circular sidewall ~~formed~~ therein, the pump also having a second pump stage, which includes a casing in which a second impeller is installed, the casing having another open sided recess formed therein and the pump further having an outlet section through which high pressure fuel is discharged from the pump, the improvement comprising:

a spring pin extending within the open sided recesses of the end cap and the casing and extending ~~within the circular sidewall of~~ through the open sided, spaced cylindrical channel of the port plate such that the circular sidewall ~~partially~~ encapsulates the spring pin wherein the spring pin aligns the inlet section and the first and second pump stages, and due to the respective open side of each of the end cap recess, the casing recess and the port plate cylindrical channel, such that expansion forces exerted on and by the spring pin against the circular sidewall are distributed and dissipated to and through the end cap, the casing and the port plate such that the forces are not concentrated about the port plate cylindrical channel.

2. Cancelled.

3. Cancelled.

4. (Currently Amended) The fuel pump improvement of claim 1 further including a second spring pin for aligning the inlet section, the first and second pump stages and the outlet section, and including a second open sided recess

formed in each of the end cap and casing and further including a second open sided, spaced cylindrical channel formed in the port plate in which the second spring pin is received.

5. Cancelled.

6. Cancelled.

7. (Previously Presented) The fuel pump improvement of claim 4 in which each spring pin has a hollow, cylindrical shape with a longitudinal slot extending the length of the pin.

8. Cancelled.

9. (Previously Presented) The fuel pump improvement of claim 4 in which the pins are made of a spring material, the springs being compressed when the inserted in the open sided channels of the port plate with the pins thereafter expanding against each circular sidewall of the open sided channels with the force exerted by the pins on the channel sidewalls maintaining alignment of the inlet section and the first and second pump stages.

10. (Previously Presented) The fuel pump improvement of claim 4 in which the two spring pins, the open sided recesses formed in the end cap, the casing and the open sided, spaced channels formed in the port plate are arranged offset in a predetermined angular relationship with each other for proper alignment of the fuel pump components during pump assembly.

11. (Currently Amended) A multi-stage turbine fuel pump for automotive vehicles comprising:

an inlet section through which low pressure fuel is drawn into the pump, the inlet section including an end cap having an open sided recess formed therein;

a first pump stage, including an impeller and a port plate in which the impeller is installed, the port plate having an interiorly formed open sided, spaced cylindrical channel which has an internal circular sidewall ~~formed~~ therein;

a second pump stage, including a casing in which a second impeller is installed, the casing having another open sided recess formed therein;

an outlet section through which high pressure fuel is discharged from the pump; and

a spring pin extending between the open sided recesses of the end cap and the casing and ~~extending within the circular sidewall of~~ through the open sided, spaced cylindrical channel of the port plate such that the circular sidewall ~~partially~~ encapsulates the spring pin wherein the spring pin aligns the inlet section and the first and second pump stages, and the open sided recess in the end cap, the open sided recess in the casing and the open sided cylindrical channel in the port plate distribute and dissipate such that expansion forces exerted on and by the spring pin against the circular sidewall dissipate to and through the end cap, the casing and the port plate such that the forces are not concentrated about the port plat cylindrical channel.

12. Cancelled.

13. (Previously Presented) The fuel pump of claim 11 including a pair of spring pins for connecting the inlet section, the first and second pump stages and the outlet section together, the spring pins being installed on opposite sides of the fuel pump and partially within the end cap, port plate, and casing in which each of the spring pins is received.

14. Cancelled.

15. Cancelled.

16. (Previously Presented) The fuel pump of claim 13 in which each spring pin has a hollow, cylindrical shape with a longitudinal slot extending the length of the pin, the pins being made of a spring material, and each pin being compressed when inserted in place for the pin to thereafter press against the circular sidewall of the open sided channel in which it is inserted, the force exerted by the pin on the channel sidewall maintaining alignment of the inlet section, the first and second pump stages and the outlet section.

17. (Currently Amended) An alignment means for use in a multistage turbine fuel pump for aligning components comprising respective stages of the pump, the alignment means including a spring pin made of a spring material and having a hollow, cylindrical shape with a longitudinal slot extending the length of

the pin and the fuel pump components each having an open sided channel formed therein such that forces exerted on and by the spring pin, when installed in the open sided channel, exerts a force on the components to maintain them in alignment are distributed and dissipated through the fuel pump components so that the forces are not concentrated about the channels.

18. (Currently Amended) The alignment means of claim 17 including a pair of substantially identically formed spring pins, the fuel pump components including respective open sided channels for each pin wherein the open sided channels partially encapsulate each pin.

19. (Previously Presented) The alignment means of claim 18 wherein each pin is compressed when inserted in the open sided channel for the pins to thereafter press against a sidewall of the open sided channel in which it is inserted, the force exerted by the pin on the open sided channel sidewall holding the components in alignment.

20. (Previously Presented) The alignment means of claim 19 in which the two spring pins and the open sided channels formed in which the spring pins are received are arranged in a preferred orientation to properly align the components during pump assembly.

21. (Previously Presented) The alignment means of claim 19 in which the fuel pump is a two stage fuel pump having an inlet end cap, a first stage port plate and a second stage casing, the inlet end cap, port plate, and casing each having open sided channels formed therein in which the respective spring pins are received, thereby to dissipate forces transferred from the spring pins to these components rather than concentrating the forces thereabout and causing damage to the components.